F·A·A·M facility for airborne atmospheric measurements

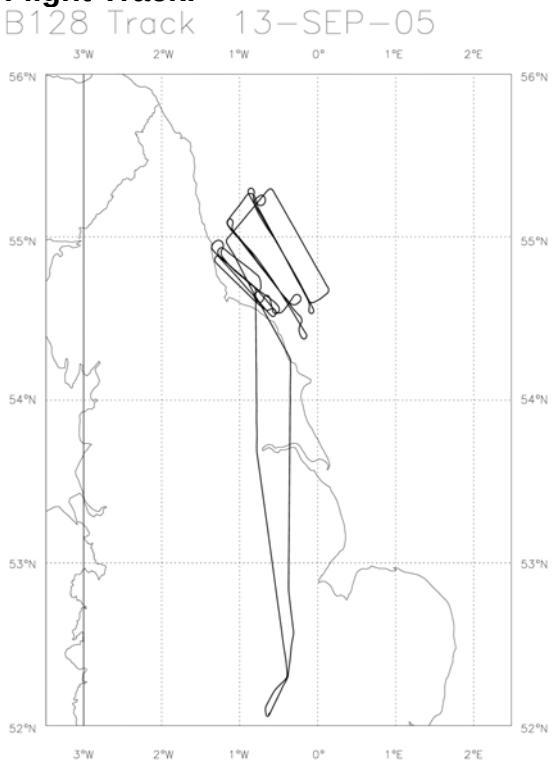
FLIGHT FOLDER

Flight No.:	B128
Date:	13 Sep 2005
Take Off	11:05:14
Landing:	15:44:08
Flight Time	4h38m54

Campaign: CLOPAP 6
Operating Area: Teesside

POB	Position	Name	Institute
1	Captain	Alan Foster	Directflight
2	Co-pilot	Graham Morgan	Directflight
3	CCM	Gaynor Ottaway	Directflight
4	Mission Scientist	Keith Bower	Manchester University
5	Flight Manager	Jim Crawford	FAAM
6	Flight Manager Training	Ruth Purvis	FAAM
7	Core Chemistry	Doug Anderson	FAAM
8	Cloud Physics / CCM2	Jamie Trembath	FAAM
9	CCN	Stuart Heath	FAAM
10	CVI	Paul James	FAAM
11	NOxy	Dave Stewart	UEA
12	AMS	Jonny Crosier	Manchester University
13	PTRMS	Jennifer Murphy	UEA
14	WAS	Jimmy Hopkins	York University
15	WAS training	Debbie O'Sullivan	UEA
16	ADA CPI	Martin Gallagher	Manchester University
17			
18			
19			
20			

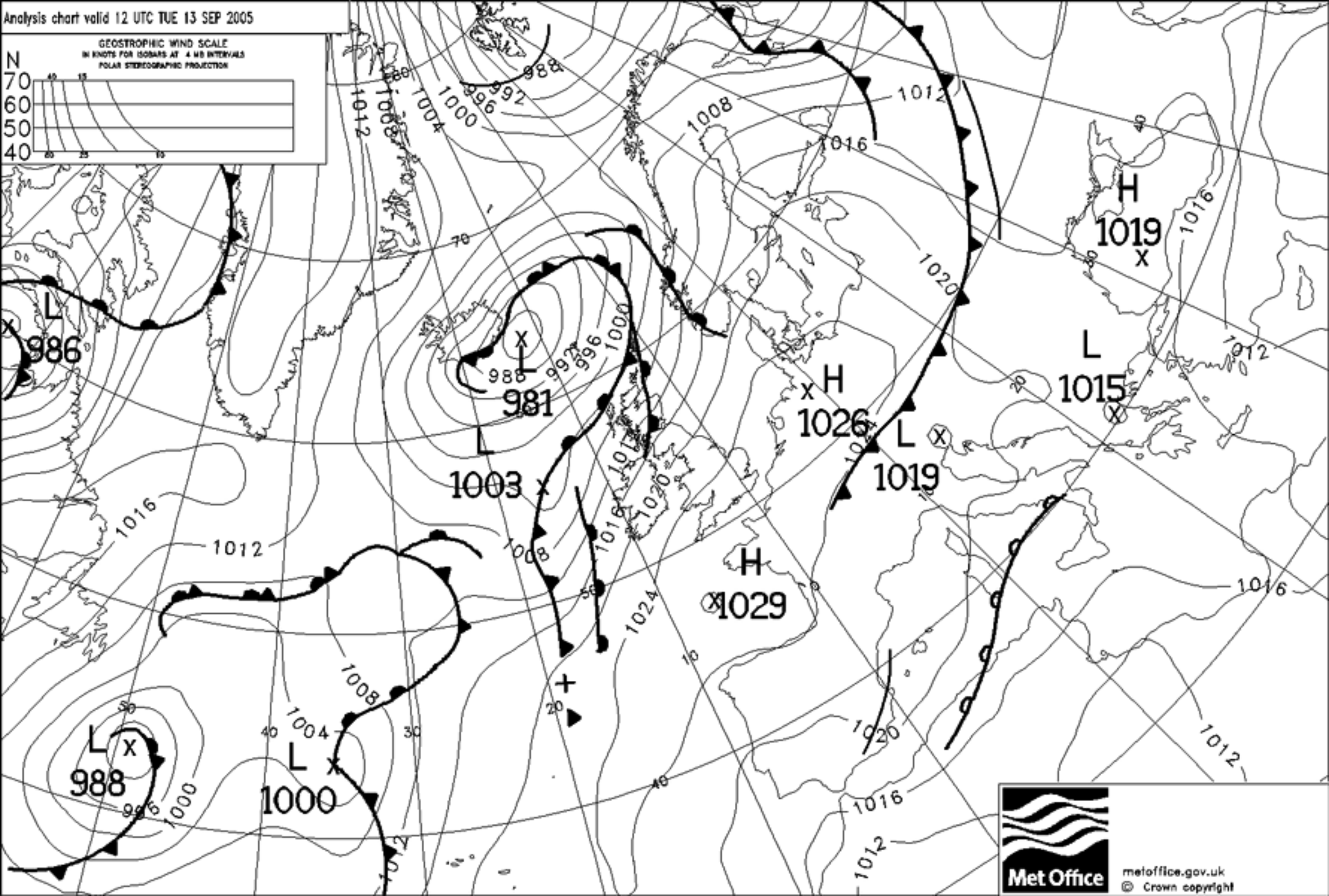
Flight Track:



FLIGHT SUMMARY

Flight No b128
Date: 13/9/05
Project: CLOPAP
Location: Teesside

Start Time	End Time	Event	Height (s)	Hdg	Comments
102935		inu to nav	0.02 kft	132	
110514		T/O	7.0 kft	038	
111114		ASP	7.1 kft	352	rhs open at to, lhs 1 11004
112026		twc	10.0 kft	350	failed to start, power recycled
113636		videos	10.0 kft	354	ffc & rfc tapes 1 started
113828		descent	9.1 kft	354	descent from transit to 5000ft
114445	114933	Profile 1	4.9 - 0.77 kft	302	
115112	115322	Profile 2	0.84 - -.12 kft	131	
115421		qnh	0.53 kft	132	1020
115847		nev & jw zeros	0.81 kft	230	
120528	121413	Run 1	0.82 kft	301	
121553	122329	Run 2	0.81 - 0.78 kft	133	
122656	123449	Run 3	2.8 kft	309	
122848		nev jw zero	2.8 kft	307	122630
123939	124621	Run 4	3.8 kft	142	
124307		video	3.8 kft	131	ffc & rfc tapes changed - no 2 started
125525	130224	Profile 3	5.0 - -.12 kft	312	
130608	132017	Run 5	0.77 - 0.84 kft	359	
132436	133747	Run 6	2.6 kft	307	
134658	135321	Profile 4	5.0 - -.12 kft	159	
134758		videos	4.2 kft	154	videos changed 13:44:10
135424		qnh	0.84 kft	154	1021
140228	141423	Run 7	0.83 - 0.79 kft	322	1000ft
141735	143030	Run 8	2.5 kft	155	cloud run @ 2700ft
143402	144601	Run 9	0.78 - 0.83 kft	318	1000ft
		Run 10 omitted			
144838	145455	Run 11	2.7 kft	227	started at 14:08:06
145051		videos	2.7 kft	227	changed at 14:49
145543	150751	Run 12	2.7 kft	154	
152944		ASP closed	11.0 kft	174	
154408		land Cranfield	0.08 kft	226	
155016		GPS final position	0.08 kft	310	52'04.36N 0'37.50W
155125		INU final position	0.08 kft	310	52 02.58N 0 40.30W


Analysis chart valid 12 UTC TUE 13 SEP 2005
GEOSTROPHIC WIND SCALE
IN KNOTS FOR ISOBARS AT 4 MB INTERVALS
POLAR STEREOGRAPHIC PROJECTION
N
70
60
50
40
L
986
L
981
L
1003
H
1026
H
1019
L
1015
H
1029
L
988
L
1000
Met Office
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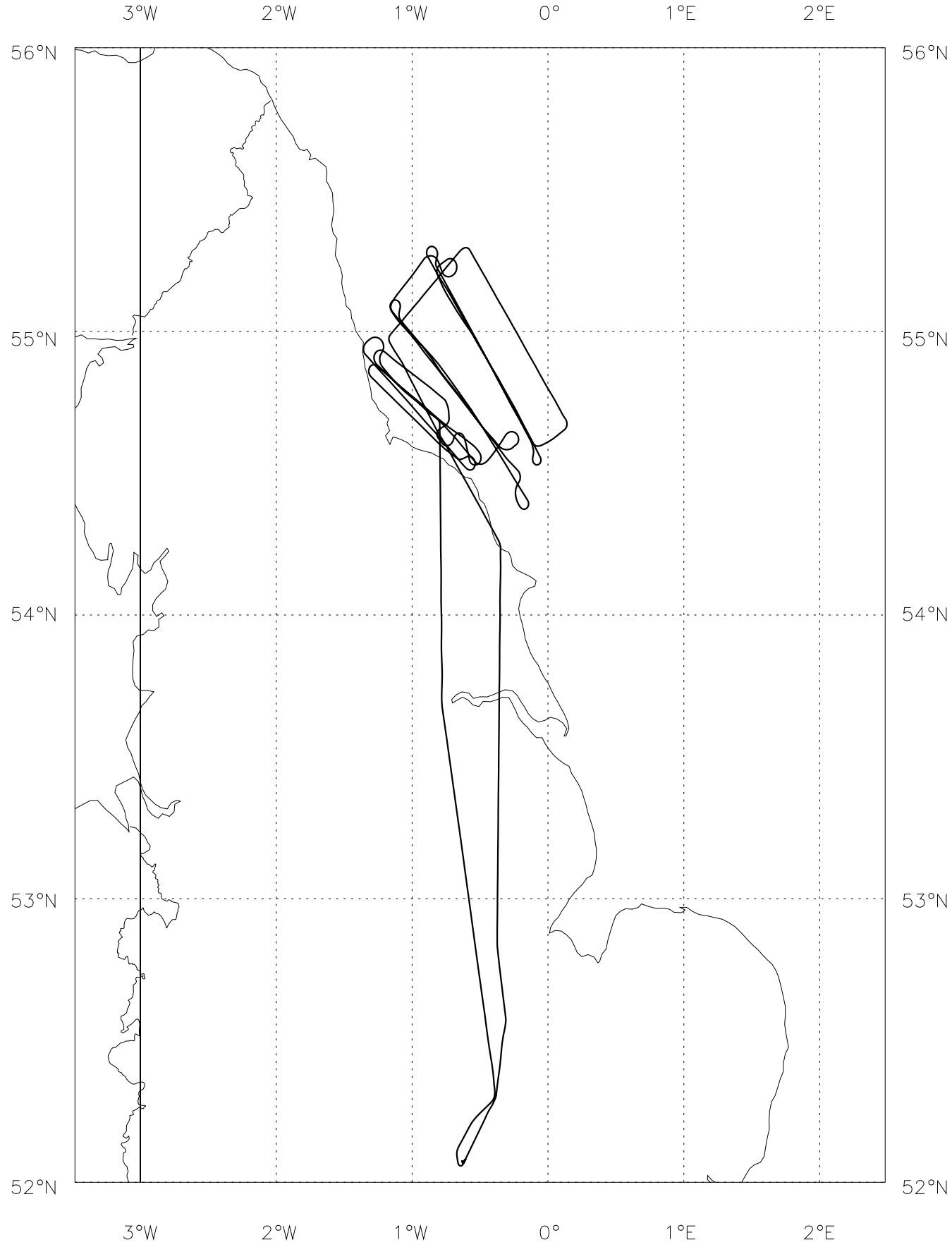
B128 Track 13-SEP-05



Sortie Brief: CLOPAP 6 (draft 1 : prepared by K.N. Bower)

Flight Number : B128
Date: Tuesday 13th September 2005 **Mission Scientist: Keith Bower**

CLOPAP Sortie Aims:
To study the evolution of aerosol in an urban plume as it advects away from the source. To investigate the interaction of the aerosol and gases with cloud both as the aerosol/gas modifies the cloud microphysics and the cloud modifies the aerosol and gases.

CLOPAP Sortie Location:
The plan is to fly in an area of low cloud and sample pollution from a major urban area as it advects towards and interacts with the cloud layer. The experiment will be flown off the north-east coast of England sampling the pollution plume originating from the Teeside (or Manchester) region as it advects out in the forecasted SW winds. As on previous missions we will operate in the area: 54.50N 1W, 55.20N 0W, 54.40N 0.40E, 54.10N 0E, with the first cross-wind leg occurring as close the coastline as possible avoiding any danger areas (say 3-4 miles out). It is not clear from the forecast if there will be low cloud forming in this region or not, but the experiment will be carried out even in the absence of cloud on this occasion, so that the evolution of the particles and gases in the plume can be investigated in either clear or cloudy conditions. In cloudy conditions, three-four sets of cross-wind runs of 12 minutes duration will be attempted in the time available (although this may be adjusted by the mission scientist omitting parts of these sets of runs to best achieve the science goals in the conditions encountered).

CLOPAP Sortie Summary:
The case studies will be carried out by flying a series of 84 km# transects across the plume within the boundary layer (one below cloud, and at least one in cloud) and one in the lower free troposphere immediately above cloud top. Each of these sets of transects will be immediately preceded by a vertical profile extending into the lower free troposphere starting from as close to the surface as possible. These profiles will establish the vertical mixing and structure of the sampled air and establish the optimum altitudes for the following transects. This flight pattern will be repeated at intervals of about 50km# to obtain up to 4 sets of transects. Although we are not aiming to perform a comprehensive Lagrangian study, this flight plan will allow us to approximately track the same air as it is advects downwind of the source region. Runs may be cut down to a minimum length of 12 minutes (or 84km) duration, or cut out to do only three sets of runs, or certain profiles sacrificed in order to achieve the required study of plume evolution and interaction with cloud. In the absence of cloud fewer boundary layer transects will be performed, ie the "in-cloud" leg (and some profiles) will be omitted, and the spacing between sets of legs reduced so as to carry out more sets of runs (and hence improve detection of clear-air plume evolution) in the operational area.

CLOPAP Sortie Detail:

1. Take off and climb to FL 110 for transit at cruise speed to operating area (with appropriate time [~20mins] spent carrying out NOxy calibration at that level)
2. When downwind of chosen urban source, descend to minimum safe altitude below cloud. Perform a profile ascent by climbing at 1000 ft per minute to pass through cloud and to an altitude 200 ft above cloud top/ boundary layer top.
3. Descend to below cloud base, proceed across wind in the boundary layer until outside the plume as detected by CN counter/gases. Mission scientist to announce out of cloud transect. Perform a straight and level run (SLR) below cloud base (200 ft below cloud base) across wind and of length 84 km#. CCN measurements should commence at the start of this run.

Core Chemistry calibrations should be carried out at start of run (as required) and completion announced so that WAS sampling can begin.

4. Ascend to the middle of the cloud layer. Turn through 180 degrees. Mission Scientist to announce in cloud transect (AMS to switch to CVI inlet) and perform SLR of length100 km[#]. NB.
5. Ascend to 200 feet above cloud top turn through 180 degrees - mission scientist to announce out of cloud transect (AMS to return to Rosemount inlet). Perform a SLR of length 100 km[#]. CCN measurements should also commence at the start of this run.
6. Ascend to cruising altitude to transit to 50 km downwind and repeat steps 2 to 6
7. Continue repetitions until available flight time in science area is exhausted

<u>NB. In the absence of cloud:</u>

8. In the absence of cloud steps 3 and 4 will be replaced by a single in boundary layer cross-wind transect, and the transit distance between sets of runs in item 6 will be reduced to 25km to enable more sets of cross wind runs to be carried out.

9. Climb to transit level to return to home base (with appropriate time [~20mins] spent at FL100 for NOxy calibration)

Sortie Brief: CLOPAP 6 (Interaction of pollutant aerosol with warm cloud) : TWC/KNB

CLOPAP Scientific Aims

1. To investigate the evolution of an urban plume as it is advected away from the source in cloudy conditions (if low cloud in this area)[#]. Changes in chemical speciation and the partitioning of species between the gas and particulate phases will be investigated.
2. To measure the changes in the size distribution and Cloud Condensation Nucleus (CCN) activity spectrum of the aerosol.
3. To measure changes in cloud microphysics as the aerosol properties in the plume, particularly those of the sub-set of aerosol acting as CCN.
4. To investigate the differences in the composition of aerosol that form cloud droplets and those that remain unactivated and interstitial to the cloud, and to observe how this changes as the plume ages.
5. To investigate the role of vertical exchange between the boundary layer and the free troposphere to understand its effect on the transport of aerosols and trace gases on the cloudy plume.

CLOPAP Weather Conditions

Ideally, a stratocumulus capped boundary layer forming over the sea downwind of a main source of urban air pollution. Limited convective penetration of the boundary layer top is acceptable (but not deep convection). The cloud cover should exceed 70% in the study areas.

CLOPAP Key Measurements requiring operator intervention during flight

Cloud Physics

- **FFSSP, 2DC, 2DP, PCASP**, Normal monitoring to ensure correct operation. Operator should note particular features of interest eg. high/low concentrations,
- **ADA and CPI** – as above
- **CCN** - alleviator should be filled whilst in clear air either below, or upwind of the cloud layer(s) of interest. 1 sample and spectrum per run, if possible.
- **J-W LWC and Nevzorov LWC/TWC**. Where run is only partially in cloud and starts in clear, these should be zeroed/calibrated and logged by Flight Manager.
- **TWC** – initial profile should avoid cloud, if possible, to achieve good calibration.

Chemistry Measurements

WAS - 2 bottle samples per 100km flight leg unless otherwise notified by the Mission Scientist (first sample to be collected after core chemistry calibrations are completed).
NOxy, Ozone, SO2, CO, PTRMS, Hydrogen peroxide to operate continuously.
AMS - to be operated on **Rosemount inlet** out of cloud, **CVI** inlet in cloud. The inlet should be kept closed to avoid contamination whilst the GPU is operating prior to takeoff. It may be opened once the GPU has been removed or after take-off. Similarly, intake should be closed before GPU is started post-flight or before landing.
Filters – these should be exposed on boundary layer out of cloud runs.

Video – the default recording setup should be forward and rearward facing.

CCN measurements :alleviator should be filled at the start of cloud free passes.

Bottle filling and **filter sampling** should occur in clear air transects only. Three[#] bottle samples should be filled during each boundary layer transect and 1 during the free troposphere transect. The Mission scientist will indicate when in plume using CN and selected gas measurements. All other instruments should run continuously.

Mission Scientist's Log

M. Sci. KEITH BOWER CLOPAP 6

Flight No B.128 Date 13/09/05 Page 1 of 5

GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
12:05:10	BST				T/O
12:07:00	BST				Scattered SC clouds CB~3100 CT~4300
12:09:46	BST	FL70			
12:13:30	ish	FL100			NOxy cal start
12:15:50	= 11:15:49	HUMANCE			Time check.
11:32:00					SO_2 instrument - data connection repaired
					- pressures flat lining
11:36:BB					NOxy cal/mix cals have been completed
					Clouds above operational area 12000' - looks
					clear in BL.
11:40:00	ish	FL70	354°	54.4N/0.7W	780mb 9.3°/-21.1°C 8m/s/253°
11:41:12	descent	FL50	354	54.5/0.7	leaving aff. 11.7b/-59.2°C 842mb 232kts
					12m/s/244°
11:44:20					Teesside 220/17 kts. wind
11:44.33	P1 start				
11:49:24	P1 ext	1000'			to finish P1 on
					2D & aerosol 4X (gums) PCASP.
11:51:11	P2 rec		131°		r setting 1020
11 53:22	P2 end		133°		
					AMS NO_3/SO_4 ↑, Aerosol ↑, NO_2 ↑
					PCASP, AMS,
12:05:86	R1 st	1000'	297	54.5/0.5	15.7b/11.0° 11m/s/212° 984mb 216kts
					just left small plume
					2D - PCASP - droplets reduced
					NOx decreasing steadily

CO2 - dropping

NO_2 - 4-5 ppb plumes in last

Mission Scientist's Log

MSci KEITH BOWER CLOUDMP 6

Flight No **B**...128..... Date ...13/09/05.....

GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
					CN shot up CO going up NO_3
					(increase in wind speed
12:05:16					spike in CO 220 ppm
					2D data init in PCASP
12.14:11	R1 end	~~1000~~ 1000			
12:15:52	R2 st	~~1000~~ 1000	138	54.5/1.2	19m/s / 222 15.41°/11.12' 985mb 203 kts
12:19:40					Plume at start - data again raw NO_3
					CN big peak, SO_2,
					bits of CCN too
					PCASP - ↑ shot up - show granules factors
12:23:29	R2 end				AMS mass huge 4μg/s NO_3 SO_4
		~~3000~~ 3000			start
12:26:55	R3 st	3000	308	54.5/0.6	in cloud at start. Bm/s
					PCASP - (20 000 x 15 ↑ ??) seeing droops
					NO_2 low NO_y detected HNO_3 high
12:28:53					Out of Cloud now.
12:32:05	R3	3000	307	54.7/1.0V	small peak in NO_2 - AMS low.
					CN reading
12.					Thick cloud but moving
12:36:00	R3 end	3000			At end of run - picked up Newcastle still
					(small uptick in core data)
12:39:30	R4 st	4000	141	54.8/1.1W	Above. CT 13.83/-1.44 Bm/s/259 882.6
					Photo
12:46					
12:55:28	R3 st	5000-50	312	54.6/0.5	

23½ hrs left on tank →

16:15 Head home back.

Mission Scientist's Log

M. Sci KEITH BOWER CLOPAS 6

Flight No **B**128 Date 13/09/05 Page 3 of 5

GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
13:00 ish		~~2000~~ 1500	312	54.8/0.6W	CN ↑, NO_2 ↑
13:02:22	PBand	50'	307	54.9/1.0W	and climbing
13:04:ish		1000		55.0/1.1W	and turning at N end of runs
13:06:08	RS st	1000'	149	55.0/1.1W	12m/s /233° 15.56/12.0 964mb 203Hz
					CN, NO_2 stayed same since last 1500'
13:11:50	RS	1000'		54.7/0.7	CN ↑ NO_2 ↑ NO_2 ↑ SO_2 ↑ CN ↑
					2D nothing
					PTRMS high Benzene too
13:16:46	RS	1000'	148	54.6/0.5	Plume end Wind 234
					PCASP 120V (ct 400) NO_2 (NO_{2y})
					NO_2 ↑ NO_{2y} NO ↓ slight spike
					PCASP dropping off now (3 min wide)
13:20:15	RS end	1000			huge spike - Leeds Bradford (urban plume)
13:20:40		2800'			level - cals started
13:24:37	R6	2800	308	54.4/0.2	11.11/9.55 14m/s /216°
13:25.40	R6	2800	311	54.5/0.3	Cur Chem cals done - in cloud at start
1hr 40	13:30:40	R6			Now out of cloud - above an inversion?
start at 4 pm					NO$_y$ ↓ CN ↓
	13 31:35				NO_y ↑ CN ↑
					CN ~ PCASP - cleanest yet - back in cloud
	13:37:45	R6 end	2800	55.0/1.1	at end of run
	13 39.45				Climbing for transit to next start
	13:46:39	~~R7 st~~			12.88 8.17, 9m/s /248
	13:46:56	R4 st	900 →	55.1/0.7	
	13:49:00				2 Photos RHS BL looking W

Mission Scientist's Log

M. Sci. KEITH BOWER CLOPAP 6

Flight No B.128..... Date 13/09/05..... Page 4.. of 5.....

GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
13:50:00	P4				Cloud looks to be ~ 2900—2000'
					(ends up as hazy layer)
13:51.25	P4	1000			(P setting 1021 for altimeter)
					Wk plume in CN / NO_y / SO_2
					VOC went up high
13.53.17	P4end	50'	151	54.8/0.4	
		1000'			4ug SO_2 2ug NO
14:00:00	end SLR	1000'		54.5/0.0	turning RMT, hit Leeds/Bradford plume again
14:02:26	R7 st	1000'	322	54.6/0.1	16.34/11.05°C 9m/s/221 983mb 215ht
14:07:10					at S point (original track) going N
14:08:45	R7	1000			hit plume - CO 210, NO_2 very sharp
					again -
14:14:36	R7 end	1000	318	55.1/0.8	250/16 Stc Wind Newcastle
					Climbing to 2700
14:17:34	R8	2700			
14:20:04	R8	2700ft.	152	55.1/0.7	
14:26:25	R8		153	54.7/0.3	11.75/6.88 1Km/s/237 0.24mb 222ht
					2D 3 spatial BC@550, CO, NO_x ↑ CN plu
14:29.09	R8	"	151	54.6/0.2	Cloud again
					NO_3 7ng SO_4 zero, NO_2 going do
					CO going down again now
14:30.29	R8 end	"	"	54.5/0.1	
14 33:59	R9 st	1000	320	54.6/0.0	210 Wk 16.55/11.32 12m/s/220°
14:45:59	R9 end	1000	318	55.2/0.5	17m/s/222 16.69/12.15°
					until climb to 2900' and head back to

last ~~the~~ run cross

Mission Scientist's Log

M.Sci KEITH BOWER CLOPATRA 6

Flight No **B**...128..... Date ..13/09/05..... Page 5 of 5

GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
14:46:03	RN st	2900	222	55.1/0.7	917mb 4.62/11.23°C 915mb 16mb/25s
14:50:50					In cloud - out - 2 photos (14.51.47)
					in and out of cloud
14:54:00					In cloud - thick
14:54 54	RN end	2900			turning left
14:55:41	R12 st	2900			
15:01:20	R12	2900			small plume - NO_2, CN SO_2 ?
15:02:16	R12	2900	151	54.6/0.8W	17m/s/240° 1054'/9.19° 918mb
					pictures of factory plume
15:04:25	R12				Whitby directly ahead/back
15:07:49	R12 end	2900	154	54.3/0.4W	climbing - good product of Leeds Bradford
15:12:08	NO2 st	FL110	184	54.0/0.3W	11 m/s/256° 670mb 2.68°/-9.38 669mb
15:29:07	NO2 end	FL110	174	52.7/0.3W	Cal complete

Overhead 20 to Mr.

CORE CHEMISTRY FLIGHT LOG FOR FLIGHT FOLDER

Flight Number : B128
Date : 13 Sep 2005
Operator and contact info : Doug Anderson (dougan@faam.ac.uk)

Problems with Instruments

CO	Occ drops in lamp flow/temp due to loose board. Fixed ~ 09:45Z @ ~11:02Z
O_3	None
NO_x	None
SO_2	Loose HORACE link cable. Fixed 11:30-11:31:30Z
TDLAS	Not fitted
WAS	None notified

CO Calibrations

A full calibration lasts approx three minutes, it consists of a cal and a zero
Shorter (quick cals) are sometimes done at low level which is calibration only

Time (GMT)	Level	Comments
09:04:13	ground	Last auto cal still set from previous flight
09:33:40	ground	Loose board meant poor cal, board pushed in
10:07:11	ground	Board OK this time
11:19:27	FL100	Board OK
12:02:03	1000’	
12:28:16	3000’	
12:39:00-12:39:40	4000’	Quick cal valve check OK so no need for full cal
12:51:24	FL050	
13:06:42	1000’	
13:25:37	2800’	
13:56:59	1000’	
14:19:31	2700’	
14:36:16	1000’	
14:50:59	2900’	
15:15:08	FL100	

CLOUD PHYSICS LOG

Flight No. B128 **Date: 13/8/05** **Operator:JT** **Page1 of**

G.M.T.	PCASP		FSSP	SID1	2D2-C			2D2-P			Remarks
DRS Time	Conc/cc	Mean R	Block Transfer	Particle Count	Conc/L	Max Size	Habit	Conc/m3	Max Size	Habit	
11:44:27	45	0.08	7	Not required	0	0	0	00	0	0	Start Profile 1 decent 5000ft
11:45:31	92	0.08	7		0	0	0	0	0	0	4000ft
11:46:34	103	0.06	7		0	0	0	0	0	0	3000ft
11:47:41	408	0.09	7		0	0	0	0	0	0	2000ft
11:48:50	418	0.09	7		0	0	0	0	0	0	1000ft P1 end
11:51:07	387	0.09	7		0	0	0	0	0	0	1000ft P2 start
11:51:39	568	0.08	7		0	0	0	0	0	0	500ft
11:52:25	471	0.08			0	0	0	0	0	00	100ft
11:53:00	478	0.09	7		0	0	0	0	0	0	50ft P2 end
12:05:25	1079	0.09	7		0	0	0	0	0	0	Start Run 1 1000ft cross wind
12:07:00	1059	0.09	7		0	0	0	0	0	0	
12:09:00	553	0.09	7		0	0	0	0	0	0	
12:11:00	507	0.09	7		0	0	0	0	0	0	
12:13:00	450	0.08	7		0	0	0	0	0	0	
12:14:11	436	0.07	7		0	0	0	0	0	0	Run 2 end
12:15:52	548	0.07									Start Run 3 1000ft
12:17:00	771	0.07	7		0	0	0	0	0	0	
12:19:00	768	0.08	7		0	0	0	0	0	0	
12:21:00	738	0.08	7		0	0	0	0	0	0	
12:23:00	1194	0.09	7		0	0	0	0	0	0	
12:23:27	1393	0.09	7		0	0	0	0	0	0	End run 2
12:26:54	1127	0.1	21		0	0	0	0	0	0	Start run 3 3000ft
12:28:00	711	0.1	29		0	0	0	0	0	0	Broken cloud
12:30:00	87	0.08	29		0	0	0	0	0	0	
12:32:00	35	0.06	29		0	0	0	0	0	0	
12:34:00	37	0.06	29		0	0	0	0	0	0	
12:34:47	529	0.01	34		0	0	0	0	0	0	End run 3
12:39:37	39	0.06	136		0	0	0	0	0	0	Start run 4 4000ft
12:41:00	91	0.06	136		0	0	0	0	0	0	
12:43:00	68	0.06	136		0	0	0	0	0	0	
12:45:00	109	0.07	136		0	0	0	0	0	0	
12:46:19	227	0.07	136		0	0	0	0	0	0	End of run 4

CLOUD PHYSICS LOG

Flight No. B128 **Date:13/09/05** **Operator:JT** **Page 2 of 4**

G.M.T.	PCASP		FSSP	SID1	2D2-C			2D2-P			Remarks
DRS Time	Conc/cc	Mean R	Block Transfer	Particle Count	Conc/L	Max Size	Habit	Conc/m3	Max Size	Habit	
12:55:24	161	0.09	136	Not requested	0	0	0	0	0	0	Start P3 5000ft
12:56:44	29	0.07	136		0	0	0	0	0	0	4000ft
12:57:54	30	0.06	136		0	0	0	0	0	0	3000ft
12:58:58	400	0.08	136		0	0	0	0	0	0	2000ft
12:59:54	674	0.09	136		0	0	0	0	0	0	1000ft
13:00:40	538	0.09	136		0	0	0	0	0	0	500ft
13:01:30	477	0.08	136		0	0	0	0	0	0	100ft
13:02:20	415	0.09	136		0	0	0	0	0	0	50ft end of P3
13:06:05	364	0.09	136		0	0	0	0	0	0	Start run 5 1000ft
13:08:00	495	0.07	136		0	0	0	0	0	0	
13:10:00	617	0.07	136		0	0	0	0	0	0	
13:12:00	628	0.07	136		0	0	0	0	0	0	
13:14:00	734	0.09	136		0	0	0	0	0	0	
13:16:00	1336	0.09	136		0	0	0	0	0	0	
13:18:00	1130	0.09	136		0	0	0	0	0	0	
13:20:00	1504	0.09	136		0	0	0	0	0	0	
13:20:15	1628	0.09	136		0	0	0	0	0	0	End run 5
13:24:36	1270	0.09	136		0	0	0	0	0	0	Start run 6 3000ft
13:26:00	1039	0.09	136		0	0	0	0	0	0	
13:28:00	679	0.09	136		0	0	0	0	0	0	
13:30:00	173	0.06	136		0	0	0	0	0	0	
13:32:00	91	0.07	136		0	0	0	0	0	0	
13:34:00	26	0.06	136		0	0	0	0	0	0	
13:36:00	200	0.08	136		0	0	0	0	0	0	
13:37:45	253	0.29	228		0	0	0	0	0	0	Run 6 ended
13:46:56	44	0.07	241		0	0	0	0	0	0	Start P4 5000ft
13:48:03	11	0.06	241		0	0	0	0	0	0	4000ft
13:49:11	16	0.06	241		0	0	0	0	0	0	3000ft
13:50:11	587	0.09	241		0	0	0	0	0	0	2000ft
13:51:09	559	0.09	241		0	0	0	0	0	0	1000ft
13:51:48	661	0.09	241		0	0	0	0	0	0	500ft
13:52:33	499	0.08	241		0	0	0	0	0	0	100ft

CLOUD PHYSICS LOG

Flight No. B128 **Date: 13/09/05** **Operator:JT** **Page 3 of 4**

G.M.T.	PCASP		FSSP	SID1	2D2-C			2D2-P			Remarks
DRS Time	Conc/cc	Mean R	Block Transfer	Particle Count	Conc/L	Max Size	Habit	Conc/m3	Max Size	Habit	
13:53:19	669	0.09	241	Not requested	0	0	0	0	0	0	50ft end of P4
14:02:06	1010	0.09	241		0	0	0	0	0	0	Start run 7 1000ft
14:04:00	1000	0.09	241		0	0	0	0	0	0	
14:06:00	628	0.09	241		0	0	0	0	0	0	
14:08:00	468	0.09	241		0	0	0	0	0	0	
14:10:00	475	0.09	241		0	0	0	0	0	0	
14:12:00	490	0.09	241		0	0	0	0	0	0	
14:14:00	358	0.09	242		0	0	0	0	0	0	
14:14:36	390	0.09	242		0	0	0	0	0	0	End run 7
14:17:33	190	0.09	242		0	0	0	0	0	0	Start run 8 2700ft
14:19:00	81	0.07	243		0	0	0	0	0	0	
14:21:00	95	0.08	243		0	0	0	0	0	0	
14:23:00	639	0.08	243		0	0	0	0	0	0	
14:25:00	468	0.09	243		0	0	0	0	0	0	
14:27:00	363	0.09	243		0	0	0	0	0	0	
14:29:00	1277	0.09	243		0	0	0	0	0	0	
14:30:29	1257	0.09	243		0	0	0	0	0	0	End of run 8
14:34:00	1188	0.09	243		0	0	0	0	0	0	Start of run 9 1000ft
14:36:00	765	0.09	243		0	0	0	0	0	0	
14:38:00	568	0.09	243		0	0	0	0	0	0	
14:40:00	392	0.09	243		0	0	0	0	0	0	
14:42:00	537	0.09	243		0	0	0	0	0	0	
14:44:00	397	0.07	243		0	0	0	0	0	0	
14:46:00	406	0.09	243		0	0	0	0	0	0	End of run 9
14:48:05	138	0.08	243		0	0	0	0	0	0	Start of run 11 2900ft
14:50:00	322	0.09	243		0	0	0	0	0	0	
14:52:00	174	0.09	297		0	0	0	0	0	0	
14:54:55	332	0.2	491		0	0	0	0	0	0	End of run 11
14:55:43	181	0.08	700		0	0	0	0	0	0	Start of run 12 2900ft
14:57:00	579	0.09	700		0	0	0	0	0	0	
14:59:00	392	0.09	700		0	0	0	0	0	0	
15:01:00	509	0.09	700		0	0	0	0	0	0	

CLOUD PHYSICS LOG

Flight No. B128 **Date:13/09/05** **Operator:JT** **Page 4 of 4**

G.M.T.	PCASP		FSSP	SID1	2D2-C			2D2-P			Remarks
DRS Time	Conc/cc	Mean R	Block Transfer	Particle Count	Conc/L	Max Size	Habit	Conc/m3	Max Size	Habit	
15:03:00	767	0.09	700		0	0	0	0	0	0	
15:05:00	941	0.1	700		0	0	0	0	0	0	
15:07:51	1057	0.1	700		0	0	0	0	0	0	

FLIGHT NUMBER: B12	DATE: 13/9/05	OPERATOR: PayRJ	Page 1 of 2
PROJECT: AmyRap			

CCN LOG

ALLEVIATOR GMT ON	OFF	HEIGHT	TEMP INLET	1	2	STATIC 3	4	5		REMARKS
				1.75	2.5	3.5	4.25	5.5		t = 290.5852
143450		1000		0.45	0.63	0.98	1.28	1083	S	
	1435			470	18.75	2962	3591	4092	D	P = 984.5668
	20			573	569	592	668	8000	B	
				2388	2396	2391	2391	2397	R	
				1009.5	1009.4	1008.	1008	1008	P	
									S	
									D	
									B	
									R	
									P	
				1.75	2.5	3.5	4.25	5.5		
									S	
									D	
									B	
									R	
									P	
									S	
									D	
									B	
									R	
									P	
				1.75	2.5	3.5	4.25	5.5		
									S	
									D	
									B	
									R	
									P	
									S	
									D	
									B	
									R	
									P	
				1.75	2.5	3.5	4.25	5.5		
									S	
									D	
									B	
									R	
									P	
									S	
									D	
									B	
									R	
									P	

FLIGHT NUMBER: B ~~28~~	DATE: 13/9/05	OPERATOR: RcPJ	Page 2 of 2
PROJECT: Ampep.			

CCN LOG

ALLEVIATOR GMT ON	OFF	HEIGHT	TEMP INLET			STATIC				REMARKS
				1	2	3	4	5		
				1.75	2.5	3.5	4.25	5.5		
120535.	12062	1000	29.53	0.46	0.66	1.02	1.29	1.90	S	t= 289.903
				1219	1760	2288	2238	3266	D	
				969	677	643	643	418	B	P = 983.3968
				2326	2360	2385	2397	2395	R	
				1007.7	1009.3	1009.2	1009.2	1009.2	P	
				0.46	0.67	1.00	1.31	1.91	S	
				765.	975	1808	1342	2000	D	983.3683 = P
121516	121550	1000	29.53	104	110	129	176	484	B	
				2361	2378	2388	2404	2411	R	289.548 = T
				1009.2	1009.2	1009.1	1009.1	1009.2	P	
				1.75	2.5	3.5	4.25	5.5		
				0.44	0.67	1.04	1.31	1.90	S	
1229	122930	3000	29.2	187	700	979	1516	1700	D	289.3688
				56	522	522	517	584	B	
				2340	2382	2382	2411	2405	R	915.4664
				1009.3	1009.3	1009.2	1009.4	1009.4	P	
				0.46	0.67	1.01	1.32		S	
				547	599	855			D	Clunker
123940	124010		28.6	493	493.	498	503		B	
				2362	2376	2405	2413		R	
				1009.3	1009.2	1009.2	1009.3		P	
				1.75	2.5	3.5	4.25	5.5		
				0.45	0.64	0.97	1.29	1.89	S	t= 289.6993
130610	130650	1000	28.8	898	963	1217	1045	2092	D	
				463	466	466	479	493	B	P = 983.8876
				2289	2288	2288	2290	2296	R	
				1008	1008	1008	1008	1007	P	
				0.43	0.64	0.96	1.3	1.95	S	
				1083	1369	1600	1815.	2000	D	286.6943
1330	133030		29.62	601	601	603	611	630	B	
				2393	2401	2410	2413	2420	R	922.1341
				1007.7	1007.9	1007.9	1007.9	1007.7	P	
				1.75	2.5	3.5	4.25	5.5		
				0.39	0.65	0.98	1.28	1.86	S	
1338	1359	1000	28.04	1595.	1,761	2087	2068	2092	D	t= 285.6317
				643	664	664	685	757	B	
				2396	2390	2381	2381	2380	R	P = 921.2292
				1007.9	1007.9	1007.9	1007.7	1007.9	P	
				0.44	0.65	0.98	1.3.	1.86	S	
	1419			753	1034	1061	1022	1800	D	t= 287.5083
1409	1430		28.54	628	628	637	628	652	B	
					2336	2335	2335	2335	R	P = 924.2457
				2342	1007.9	1008	1008	1008	P	
				1007.9						

WAS + PAN sampling summary

Flight number: B128

Date: 13/09/05

Campaign Name: CLOPAP

Operator: DEBBIE O'SULLIVAN

time	Bottle #	comments	Final pressure (bar)
		Argon cylinder pressure = 180bar.	
		WAS cylinder (filled before flight) = 75bar.	
		Copper Sulphate ≈ 4cm left to use.	
		Time Check WAS and PAN @ 10:47.	
~ 11:15		FL100 - NOxy CALS.	
~ 11:24		WAS pump and 24V switched on.	
~ 11:37		Descending to 5000 ft.	
~ 11:43:45		profile descent to 50 ft	
11:49		Interupt Profile, turns right reciprocal at 1000 ft	
11:51:16 ↓ 11:53:22		Decending from 1000 to 50 ft Profile desent 2.	
~ 12:02		plume crossed	
12:05:06		1000 ft straight and level	
12:05:28		Start of Run ①. at 1000 ft	

WAS + PAN sampling summary

Flight number: .....

Date: .....

Campaign Name: .....

Operator: .....

time	Bottle #	comments	Final pressure (bar)
12:14:13		End of Run - Turning left onto reciprocal Run	
12:15:54		Start of Run 2 reciprocal of Run 1 @ 1000 ft	
12:16:33	33	Using fast fill - 30 second fill	3.34
12:21:33	34		3.34
12:23:28		End of Run	
12:26:57		Start of Run 3 @ 3000 ft partial cloud cover	
12:28:28	35		3.26
12:30:45	36		3.28
12:32:50		end of run 3	
12:36:07			
12:39:40		Run 4 @ 4000 ft	
12:41:32	37		3.26
12:43:26	38		3.25
12:46:26		end of Run 4	
~12:58		5000 ft ~~FL50~~	
~12:55:25		Profile 3 5000ft to 50ft	

WAS + PAN sampling summary

Flight number: B128

Date: 13/9/05

Campaign Name: CLOPAP

Operator: Debbie O'Sullivan

time	Bottle #	comments	Final pressure (bar)
13:02:24		end of profile 3 @ 50 ft	
1206:08		Start of RUN 5 at 1000 ft	
13:07:01	39		3.33
13:10:59	40		3.35
13:12:50	41	In plume (extra bottle) very sharp brief plume	3.33
13:20:17		end of Run 5.	
13:24:38		Run 6. 2800 ft	
13:27:24	~~42~~	- cleanish air	3.26
13:34:37	43	- "	3.26
13:37:47		end of Run ~~5~~ 6	
		moving another 20 km out of from pollution source (point A) on my going roughly towards point B.	
13:46:58		profile descent to 50 ft → profile 4	
13:55:21		end of Profile 4	

WAS + PAN sampling summary

Flight number: .....

Date: .....

Campaign Name: .....

Operator: .....

time	Bottle #	comments	Final pressure (bar)
		Start of ~~Run 7~~ @ 1000 ft level Run.	
13:52:28	44		3.36
14:02:30		Start of Run 7 @ 1000 ft reciprocal of last Run.	
14 06:31	45		3.35
14:08:47	46	CO ↑, NO, NOx ↑ around Teeside.	3.37
14:14:~~34~~ 23		end of Run 7 -> ascent to 2700ft	
14:17:35		Run 8 -	
14:20:04	47		3.28
14:23:59	48		3.25
14:27:04	49		3.26
14:30:19	50		3.26
14:30:30		end of Run 8	

(3)

WAS + PAN sampling summary

Flight number: B128

Date: 13/8/05

Campaign Name: CLOPAP

Operator: Debbie O'Sullivan

time	Bottle #	comments	Final pressure (bar)
14:34:02		Start of Run 9 at 1000 ft	
14:36:28	51		3.36
14:40:08	52		3.37
14:44:02	53		3.35
14:46:02		end of Run 9	
		Climb to FL230 2900 ft	
14:48:08		Start of Run 11 at 2900 ft	
14:50:48		Start of cloud Run	
14:54:55		end of Run 11	
14:55:53		start of Run 12	
14:56:58	54		3.26
15:00:21	55		3.28
15:04:31	56	near whitby	3.26
15:07:52		end of Run 12.	

WAS Cylinder end pressure ~75 bar

Flight Manager's Instrument Status Log

Flight No. **B** 128 Date: 13 September 2005

Instrument	Fitted	Operated	Instrument	Fitted	Operated
Navigation			**Cloud Physics**		
INU		**Y**	**Probes**		
XR5M GPS		**Y**	FFSSP		**Y**
Cruciform GPS		**N**	PCASP		**Y**
Satcom C		**Y**	2D-P		**Y**
Satcom H		**Y**	2D-C		Y
Thermometers			Cloudscope		**N**
De-Iced Temp		**Y**	SID 1		**N**
Non De-Iced		**Y**	SID 2		**N**
Heimann		**N**	HVPS		**N**
Hygrometers			CIP25		**N**
G. Eastern		**Y**	CIP100		**N**
J. Williams		**Y**			
Nevzorov		**Y**			
TWC		**Y**			
FWVS		**N**	**Racks:**		
Radiometers			INC		**N**
Upper Clear		**Y**	CCN / CNC		**Y**
" Red		**Y**	CVI		**Y**
" Silicon		**Y**			
" JO1D		**Y**	**Aerosol**		
Lower Clear		**Y**	PSAP		**N**
" Red		**Y**	Nephelometer		**N**
" Silicon		**Y**	Filters		**Y**
" JO1D		**Y**	AMS		**Y**
Large Radiometers					
TAFTS		**N**			
MARSS		**N**			
DEIMOS		**N**	**Others:**		
ARIES		**N**	NIR TDLAS		N
SWS		N	2BT O3		N
Chemistry			VACC		N
Ozone		Y	PEROXIDE		Y
SO2		Y	Formaldehyde		Y
NOX		Y	ADA		Y
CO		Y	CPI		Y
ORAC		N	NOxy		Y
PAN		Y	PTRMS		Y
PERCA		N	Bag Sampling		N
WAS		Y	Tube Sampling		N

Faults / Incidents Log

Flight No. B128
Date: 13 September 2005

Instruments

TWC – fault light came on just after take off
SO2 – data cable had come lose was refitted just after take off
Mission scientist laptop – Problem with mouse pad, may need cleaning
Flight manger laptop – kept losing HORACE connection. This happened several times during the flight
Forward facing camera – glass needs cleaning
Nevzerov – vane beginning to unwind, no worse after CLOPAP flight
AMS – CNC on CVI faulty – may be a leak

Aircraft

Temperature – it was extremely hot on the aircraft – especially the front where is exceeded 32 degrees C

Satcom H Calls - None

MISSING LOG SHEETS:

The following logs are not available for flight B128:

Log	Reason
De-brief	Not yet available. To follow in 2006
CVI	No log is ever taken for CVI
ADA/CPI	No log taken or no copy left with FAAM
NOxy	No log is ever taken for NOxy
PTrMS	No log is ever taken for PTrMS
AMS	Log only of interest to instrument operator so no copy left with FAAM

VIDEO RECORDINGS:

Digital8 video recordings from this flight reside with FAAM (at 31 Oct 2005) :

4 x Forward Facing Cameras
4 x Rearward Facing Cameras